the immediate shore, and most of them grow in a depth of water not exceeding forty feet. It is easy to see that if the present oceans were affected by a movement similar to that described by Prof. Ball, the zone of seaweeds would be the scene of the greatest mechanical violence, and they would be alternately left to dry in the sun, or be torn with irresistible force from their anchorage, and scattered over the land washed by the flood tide. But on every old beach, of which we find so many in the geological series, the casts of the fronds and stems of seaweeds are as plainly discernible as on our present shores. Indeed we may say that of the thousand forms of animal and vegetable life which have their home along the shores of continents, the seaweeds, the boring annelids, the lingulas, the oysters, the barnacles, in short the vast majority of mollusks and all the shore-loving fishes and crustaceans, none could possibly have existed while tides such as have been described prevailed; for that which is now their chosen habitat and the zone of greatest vital activity on the globe, would have been a scene of constant and terrible destruction.

It may also be said that if, as we suppose, the precipitation of ocean waters took place before the corrugations of the earth's surface had assumed any considerable magnitude, and it was nearly or quite covered with water, tidal waves five hundred or more feet in height sweeping over the earth in rapid succession would have worn away the emerging land as fast as it appeared, would have prevented the formation of continents, and have precluded the existence of land animals or plants. And farther, since marine vegetation is practically confined to shallow water, high tides would have rendered the growth of algæ impossible; and as they have supplied the pabulum for marine animal life, it follows that, with tides six hundred feet in height, our globe would have been a lifeless one.

For the reasons cited above, and others that might be given, we are compelled to conclude that the high tides which formed the subject of Prof. Ball's lecture have had no existence during the time covered by the geological record; and further, that since the beginning of that record the order of nature has been essentially what it is to-day. The testimony of the rocks on this subject is so full and conclusive, that it really leaves no room for discussion; and hence the astronomers have been in error in regard to the genesis of the moon, and she never formed a portion of the earth's mass, or the separation took place at a period so remote that she had receded to nearly her present distance before the dawn of life on the earth.

J. S. NEWBERRY

EASY STAR LESSONS

Easy Star Lessons. By Richard A. Proctor. (London: Chatto and Windus, 1881.)

WE have been repeatedly struck by the comparative (it might have been said, more than comparative) ignorance which prevails, even among educated people, as to the nomenclature and position of the stars. There are many who would be grievously scandalised at the idea of not being able to call trees or flowers by their right names, but who seem very little concerned by having to admit a similar incompetency as to the beautiful luminaries of the skies. They would be indignant at the supposition that they did not know an oak from an ash, or could possibly mistake a cowslip for a primrose; but they have no hesitation to confess that they do not know the difference between the two dogs that have been for so many ages keeping guard in the heavens; and if possibly the pre-eminent brilliancy of Sirius, or the magnificent configuration of Orion, may have awakened enough of curiosity to ascertain what they are called, they would still be at an utter loss to discriminate between Capella and Arcturus, or to say in what constellation or at what time they are to look for the Pleiades, whose existence they can hardly ignore. It is not easy to account for such a degree of uninstructed heedlessness. One reason possibly may be, that the knowledge of natural objects which makes its way by such gentle and imperceptible approaches into the minds of intelligent children is acquired by day rather than by night, and that their rambles with parents and nurses in sunshine hours familiarise them insensibly with many things of which they would remain ignorant if they were visible only during their hours of rest. But, however we may try to explain it, so it is, that what was termed in a previous generation the "diffusion of useful knowledge," seems not to have included a popular acquaintance with the sky, and that the maps which were published under that title and to promote that object have been much more serviceable to the express student of astronomy than to educated society in general. Whether such a state of ignorance or *insouciance* may be equally prevalent in other countries we never had an opportunity of ascertaining; but there can be no doubt of it among ourselves, and as little question can be made that it is a discredit to the professed intellectual progess of the age.

Nor can a plausible excuse be fabricated from the want of adequate and familiar help. We pity those indeed who were obliged in former days to gain—or toil after—such knowledge from "exercises" on the celestial globe. Exercises indeed they were, to no common extent, of attention and patience, when some poor child had first of all to learn that left did not mean left, but right, and that she must fancy herself inside the globe to rectify what was drawn all wrong on its outside. This disagreeable and circuitous road to knowledge had indeed its advantages in the solution of problems which are probably less understood in its absence by a subsequent generation; but it was very troublesome, not to say expensive in its machinery, and passed away, to be succeeded by planispheres and delineations of various kinds, and of easier attainment, any of which would have done much towards giving the requisite information, had they been used, or we may say cared for. There was help enough had the want of it been felt as it should have been. But now that astronomy is so decidedly in the ascendant, and takes rank among the prevailing tastes of the age, an opportunity is offered for a fresh attempt, with a fairer prospect of success; and we are glad to find that it has been laid hold of by an author whose name is a sufficient guarantee for his accurate knowledge both of the objects to which he would introduce us, and of the means of delineating them as naturally, and with as little derangement of position, as may be. For it is not every one that knows—though any one may readily convince himself by a trial with the rind of a halved orange—how great is the difficulty of exhibiting a hemisphere on a plane surface, or how much ingenuity is required in arranging a number of planes to

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accomplish this end as smoothly and intelligibly as possible. No man has been more successful in this undertaking than Mr. Proctor, whose atlases for telescopic work are well known to observers; and he has now applied the same method to the production of a popular work, the object of which is to give full instruction for the naked eye (if for the eye of childhood, so much the better) as to the position of every constellation, with all its leading stars, in every quarter of the sky, for every month and practically every night in the year: and adapted not only to our own country, but to a corresponding and more extensive zone in North America also. This is a step in the right direction. It will not only offer material aid in removing the stigma of general ignorance, but prepare the youthful mind by familiar knowledge of what may be reached by the naked eye, for a more easy and unhesitating employment of the telescope in future years. Because we wish so well to Mr. Proctor's undertaking, we shall venture to point out some changes that, in our view at least, would be improvements. We can quite understand his desire of rendering his maps as full as possible; and his own eye would not be in the least embarrassed by that crowding of detail which we fear might perplex or even dishearten a beginner. But it would certainly be an advantage if there were more open space. The names of the constellations might be rendered less prominent, or abridged, or indicated by letters or symbols, and those of the principal stars might be transferred to the separate diagrams; much would be gained by an increase in the size of the stars, and greater clearness by the adoption of the easily-explained word "zenith" in place of "the point overhead." In matters of detail, a transposition may be pointed out in the diagram on p. 12; and the "sickle," on p. 90, and the "dumb-bell," on p. 176, require improvement. The text contains a great deal of interesting and amusing as well as instructive matter; but tastes may differ as to the desirableness of introducing so many remarks, however ingenious, on other ways of arranging stars in constellations, when the beginner may have enough to do in comprehending and recollecting them as they are, and will always remain. We are inclined to think that the name of the "Great Bear" is as common in England as the "Plough," and had better have been more frequently employed. On p. 108, γ and ε Cassiopeiæ stand instead of γ and δ, as pointers to the great cluster in the sword-hand of Perseus—described again, by the way, on p. 125—which most eyes, we believe, with Argelander and Heis, would see double. We have failed to find any notice in the text of the conspicuous nebula in Andromeda's girdle; and the Dumb-bell, invisible without a telescope, is not fortunately chosen as an instance of spectroscopic results, its light, according to Huggins, exhibiting only a single line. A little haste is probably traceable in these defects, which we hope the author may have an opportunity of rectifying.

OUR BOOK SHELF

Die Pflanze. Vorträge aus dem Gebiete der Botanik. Von Dr. Ferdinand Cohn. 8vo. pp. 512. (Breslau: Kern, 1881.)

THIS book may be placed by the side of Schleiden's "Die Pflanze und ihr Leben," which was published in 1847, and ran to at least six editions in German, besides being translated into English, French, and Dutch. The English edition was translated by Henfrey, and was published in 1848; and it soon became a popular book, as it dealt with various aspects of plant-life in language intelligible to every one, without any loss of scientific accuracy and without any mixture of fable and fiction.

Taking date for date, the present work does not suffer by comparison with its evident prototype; and, although there is no attempt to traverse the whole region of botany, this covers a much wider field. It is intended, as the author informs us in his preface, to be a guide to those who wish to participate in the intellectual life that pervades modern botany. Like Schleiden's work, it is based upon a number of lectures, delivered, in this case, in different parts of Germany during the last twenty years, and published in their original form in various journals. With few exceptions, however, they have been remodelled and revised, partly with the object of bringing the subjects therein treated up to the present state of knowledge, and partly with the object of eliminating repetitions and correcting inequalities of style. Each lecture is complete in itself, yet naturally a connecting thread runs through all. The opening lecture in the present arrangement, which is not a chronological one, is entitled "Botanical Problems" (noticed in NATURE, vol. xi. p. 261); and it appropriately takes precedence, because it is an historical sketch of the progress of botanical discovery. Altogether there are sixteen lectures bearing such descriptive titles as: "From the Pole to the Equator," "Life in a Drop of Water," "Invisible Foes in the Air," "Insectivorous Plants," "From the Sea Level to Eternal Snow," and so on. There is also one on Bacteria—of which organisms the author has made a special study; one on the Rose; one on the Grape Vine; and the last is on Ancient and Modern Gardens. Systematic botany, however, seems to be regarded by the writer as the particular branch to avoid teaching, for he has no lecture on the classification of plants. Perhaps he found it less easy to treat this in a popular style, or perhaps he fears that a knowledge of classification encourages the craze for collecting and learning the technical names of plants that is still far too prevalent? Anything that tends to discourage the mere collector is praiseworthy. Nevertheless, we think the principles of classification are at least of equal importance with the subjects treated. Yet in this case we are hardly justified in complaining because the author has not given more, especially as he has not promised to; and he has done so very well what he has done. There is no doubt that these lectures will be widely read, and they deserve to be, for they contain much interesting information, and they are written in an easy graceful style without superabundance of adornment. They are almost devoid of technical terms, and in all cases where they exist popular names are used in preference, though the Latin ones are given with other annotations at the end of each lecture. The book is well printed on good paper and embellished with some original and appropriate head and tail-pieces.

W. BOTTING HEMSLEY

La Lumière Électrique, son Histoire, sa Production, et son Emploi. Par Em. Alglave et J. Boulard. (Paris: Firmin-Didot et Cie., 1882.)

THE great success of the Electric Exhibition at Paris of 1881 has not failed to produce an effect upon the demand for books dealing with electrical science, and particularly with the practical applications of electricity. The wide extension of electric lighting, and the continued growth of popular interest in the subject are producing a perceptible effect also on the book market of this country. Text-books of electricity were never so greatly in demand as to-day, and we were recently informed that one of the

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